STS-108 ORBITER POST LANDING INSPECTION
DEBRIS ASSESSMENT
18 December 2001

After the 12:56 p.m. local/eastern time landing on 17 December 2001, a post landing inspection of OV-105 Endeavour was conducted at the Kennedy Space Center on SLF runway 15 and in Orbiter Processing Facility bay 1. This inspection was performed to identify debris impact damage and, if possible, debris sources.

The Orbiter TPS sustained a total of 95 hits of which 22 had a major dimension of 1-inch or larger. This total does not include the numerous hits on the base heat shields attributed to SSME vibration/acoustics and exhaust plume recirculation.

The following table lists the STS-108 Orbiter damage hits by area:

	HITS > 1-inch	TOTAL HITS
Lower Surface	17	81
Upper Surface	1	1
Window Area	4	13
Right Side	0	0
Left Side	0	0
Right OMS Pod	0	0
Left OMS Pod	0	0
TOTALS	22	95

The Orbiter lower surface sustained 81 total hits, of which 17 had a major dimension of 1-inch or larger, both numbers are well within family. The majority of the hits (49 total with 12 greater than 1-inch) were located in the area aft of the main landing gear wheel wells. Approximately 11 of the total lower surface hits were around the LH2 umbilical area and 24 around the LO2 umbilical area. Most of these damage sites around the ET/ORB umbilical were most likely caused by pieces of the umbilical purge barrier flailing in the airstream and contacting tiles before pulling loose and falling aft.

The largest lower surface tile damage site, located inboard of the RH MLG door, measured 8-1/2 inches long by 1-1/2-inches wide by 3/8-inches deep. The damage spans three separate tiles. The cause of this damage has not been determined yet.

The landing gear tires were in good condition.

ET/Orbiter separation devices EO-1, EO-2, and EO-3 functioned normally. No ordnance fragments were found on the runway beneath the umbilicals. The EO-2 and EO-3 fitting retainer springs appeared to be in nominal configuration, though one of the “salad bowl” clips was missing from EO-2 and 6 were missing from EO-3. The EO-2/3 pyro debris shutters were fully closed. A small piece of white RTV (1/2 inch long by 1/8 inch diameter) used for umbilical test-

port closeout process was found under the LH2 umbilical. No other debris was found beneath the umbilicals.

Typical amount of tile damage occurred on the base heat shield. All SSME Dome Heat Shield closeout blankets were in good condition.

There were a total of 13 hits, with 4 having one dimension greater than 1-inch, on the window perimeter tiles. Hazing and streaking of forward-facing Orbiter windows appears to be less than normal.

A 1-1/2 inch diameter by 1/4 inch deep tile damage was noted on the +Z side of the body flap, underneath SSME #3.

The post-landing walkdown of Runway 15 was performed immediately after landing. All components of the drag chute were recovered and appeared to have functioned normally.

In summary, the total number of Orbiter TPS debris hits and the number of hits 1-inch or larger were within established family. The potential identification of debris damage sources for mission STS-108 will be based on the laboratory analysis of Orbiter post landing microchemical samples, inspection of the recovered SRB components, film analysis, and aerodynamic debris particle trajectory analysis. The results of these analyses will be documented in the STS-108 Debris/Ice/TPS Assessment and Integrated Photographic Analysis report.

Armando Oliu
NASA - KSC